

# ***Interactive comment on “Optics and remote sensing of Bahamian carbonate sediment whittings and potential relationship to wind-driven Langmuir circulation” by H. M. Dierssen et al.***

**T. Smyth (Referee)**

tjsm@pml.ac.uk

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## **1 General comments**

This is an interesting paper and goes beyond the usual optical description of various oceanographic phenomena. The authors attempt, with the use of in situ optics and remote sensing, to explain the outbreak of "whittings" along the Great Bahama Bank. They attribute this to the formation of wind driven Langmuir cells.

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## 2 Specific comments

### 2.1 Langmuir cells

There is not enough description about Langmuir cells in the paper and a few vital characteristics are missed out. Firstly the orientation of Langmuir cells is parallel to the wind direction (indeed wind direction as far as I can see is not mentioned in the paper). In the northern hemisphere their orientation is  $15^\circ$  to the right of the wind direction. The action of Langmuir circulation is to setup helical rolls within the water column and this causes horizontal streaks on the surface where material (and debris) accumulates. For Langmuir cells to be postulated as a plausible explanation, evidence is required that there was indeed regular spacing (and give magnitude) between the whittings with bluer water in between. As far as I can see the only evidence of this were the MODIS Aqua images and the periodicity in the inherent optical property data.

For Langmuir cells to be setup there also needs to be stability in the direction and strength of the wind.

I agree with the authors that Langmuir is more plausible than fish activity and tidal bursting, however straightforward wind driven mixing is also consistent with the pattern observed, as is possible internal wave breaking (see da Silva et al., 2002, GRL, DOI: 10.1029/2001GL013888 although unfortunately I am not familiar with the complex physics and bathymetry around the Bahamas!)

The wind data in the manuscript leaves a little to be desired; although several stations are mentioned the wind data from Nassau airport is used which is some 160 km to the east of the in situ stations. As the authors will be aware considerable variability in wind strength and direction is often observed around islands.

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## 2.2 Optical data

The Inherent Optical Property data were well explained, although in a highly scattering medium possibly some of the corrections to the ac-9 data would have been invalidated. The authors say in line 10 of p4781 that the "proportional (correction) method was inaccurate". How was the inaccuracy determined? I also remain unconvinced about the accuracy of ac-9 determined chlorophyll concentration. Even fluorometrically determined chlorophylls would have given additional supporting evidence.

The periodicity of the VSF data was one of the supporting evidences for Langmuir circulation. However my colleagues have observed, admittedly in some of our older instruments, that there is a marked periodicity in the data even when used in the laboratory to observe well mixed polystyrene beads in a bucket of milliQ. This behaviour we have attributed to the electronics of the instrument. It might be worth checking your own instrumentation back in the laboratory to see if you get the same response.

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